

XV. MUHLENBERG'S TURTLE IN WESTERN PENNSYLVANIA

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(PLATE XXXVI)

In checking over the turtles contained in the Carnegie Museum I discovered a specimen of *Clemmys muhlenbergi* (Schoepff) which extends the range of this species into northwestern Pennsylvania. There were no specimens of this species in the collection, with which I could compare this turtle, but Dr. A. H. Wright kindly verified my identification, and more recently Dr. Thomas Barbour kindly loaned me a specimen for comparison.

The turtle is a small adult male, which was collected in Pymatuning Swamp near Linesville, Crawford County, Pennsylvania, July 10, 1906, by Dr. O. E. Jennings. Dr. Jennings recalls having collected several turtles in sphagnum areas within a few miles of Linesville in 1906, but he is unable to recall the exact habitat in which the specimen was secured. The extensive sphagnaceous areas in Pymatuning Swamp are at an elevation of approximately one thousand feet. Dr. Wright's statement (1918 a, p. 7) that Muhlenberg's Turtle likely occurred "from Syracuse or Albany to Buffalo" had led me to expect this species in Pymatuning Swamp, where conditions seem highly favorable for its survival, but in several years of collecting I failed to secure any specimens.

The specimen under consideration (No. 3147, Coll. Carn. Mus.) has a carapace 81 mm. long, 62 mm. wide, and is 34 mm. high. The shields are normal in number and arrangement, with the exception of the nuchal, which is shortened to 4.2 mm. in length by an indentation of the anterior edge of the carapace, and divided lengthwise by a light groove. Apparently both of the front feet have been mutilated, as each bears only four claws. The carapace is smooth, with only a few traces of sculpturing. The corresponding grooves in the plastron are much plainer. The skin of the head is somewhat shrivelled and discolored and the blotches are small and indistinct, less than one-half the size of those on the head of a specimen from

eastern Pennsylvania (No. 1873, Coll. M. C. Z.). The colors (in alcohol) are: carapace uniform dark brown; plastron very dark brown with small areas of dark red on the anterior pairs of shields.

The finding of this specimen partly closes the gap between the records from New York and those from North Carolina. It also supports Wright's contention (1918 b, p. 51) that this species is to be expected at higher altitudes in the southern portion of its range, if it is considered an Upper Austral form near the edge of the Transition Zone. The tamarack-sphagnum association in Pymatuning Swamp is Canadian in character, but may be affected by climatic influences of the Upper Austral. I believe that two theories may be advanced to account for the distribution of this rare turtle. Either it is an Upper Austral form, which has pushed into the Transition and Canadian Zones in extending its range northward, or it is a form with a primitive habitat of sphagnum-tamarack character, which is left as a relict in those places where such plant associations once occurred or still occur. It seems probable that the distribution of certain species must be studied in regard to their relationship with plant associations rather than in the light of climatic zones. Most of the records for this species, which refer to a definite ecological habitat, list either clear streams and ditches, or marshy and sphagnum areas. In the northern limit of its range most of the records are from sphagnum bogs. The occurrence of the species in clear streams further southward may be explained by the disappearance of boreal vegetation as post-glacial plants closed in upon such areas. Sphagnum occurs as far south as Florida even today, and tamarack in glacial times must have ranged into the Gulf States. All of the records for Muhlenberg's Turtle lie within this range and the history of the species might be briefly stated as follows: from a sphagnum-tamarack association in the southern Appalachians it spread northward and eastward under boreal conditions; as the southern bogs were encroached upon and replaced by Upper Austral conditions it remained as a relict, but in the north, where the tamarack-bogs still exist, it is still found in its primitive habitat.

Since Dunn (1917, p. 625) listed the known records for this species additional specimens have been recorded. For this reason I have felt it worth while to include in this paper a map showing the locality records and an annotated bibliography of the principal references to the distribution of this form.

LITERATURE.

- ABBOTT, CHARLES C., 1868. Catalogue of Vertebrate Animals of New Jersey. Geol. N. J., p. 800.
 Gives no definite localities.
-, 1882. Notes on the Habits of the "Savannah Cricket Frog." Amer. Nat., XVI, Sept., p. 707.
 Found specimens in meadow ditches in New Jersey.
- AGASSIZ, LOUIS, 1857. Contributions to the Natural History of the United States, I, pt. II, p. 443.
 Lists no definite records.
- BABCOCK, HAROLD L., 1917. An Extension of the Range of *Clemmys muhlenbergii*. Copeia, No. 42, Apr. 24, p. 32.
 Records specimens from Newport, R. I. taken by A. Agassiz.
-, 1918. Notes on Some New England Turtles. Copeia, No. 53, Jan. 25, p. 15.
 Again mentions specimens taken by Agassiz.
-, 1919. The Turtles of New England. Mem. Bos. Soc. Nat. Hist., 8, No. 3, pp. 401-402.
 Again lists specimens from Newport taken by Agassiz.
- BISHOP, S. C., 1923. Notes on the Herpetology of Albany County, New York, III. The Snakes and Turtles. Copeia, No. 125, Dec. 31, p. 119.
 Records a specimen from near Meadowdale, N. Y.
- BRADY, MAURICE K., 1924. Muhlenberg's Turtle Near Washington. Copeia, No. 135, Nov. 18, p. 92.
 Records a specimen from Stubblefield Falls, Fairfax Co., Va.
- BRIMLEY, C. S., 1922. Herpetological Notes from North Carolina. Copeia, No. 107, June 20, p. 48.
 Records a specimen from Clay Co., N. C.
- DE KAY, JAMES E., 1842. Zoölogy of New York, Part III. Reptiles and Amphibia, Albany, pp. 17-18.
 Records specimens from Clarkstown, Rockland Co., N. Y.
- DITMARS, RAYMOND L., 1907. The Reptile Book. New York, pp. 51-52.
 Records specimens from the Palisades of the Hudson and from Staten Island, N. Y.

- DUNN, E. R., 1915. Some Amphibians and Reptiles of Delaware County, Pennsylvania. *Copeia*, No. 16, March 15.
Records specimens from Darby Creek.
-, 1917. Reptile and Amphibian Collections from the North Carolina Mountains, with Especial Reference to Salamanders. *Bull. Amer. Mus. Nat. Hist.*, XXXVII, Art. XXIII, pp. 624-626.
Describes four specimens from Brevard and Linville as *Clemmys nuchalis*. Lists records from literature and specimens in various museums.
-, 1919. *Clemmys muhlenbergi* at Lake George, New York. *Copeia*, No. 72, Aug. 15, p. 68.
Refers to Fisher's record from Dunham's Bay.
- ENNIS, JACOB, 1861. On the young of *Kalemys muhlenbergii*. *Proc. Acad. Nat. Sc. Phila.*, XIII, June, pp. 124-125.
Records two young from Haddonfield, Camden Co., N. J.
- FISHER, A. K., 1887. Muhlenberg's Tortoise (*Chelopus muhlenbergii* Schweiger), at Lake George, N. Y. *Amer. Nat.*, XXI, pp. 672-673.
Reports frequently finding shells.
- FOWLER, HENRY W., 1906. Amphibians and Reptiles of New Jersey. *Ann. Rept. N. J. State Mus.*, pp. 240-243.
Records specimen from Medford taken by Witmer Stone, one from Palermo, and one from Grenloch. Refers to Townsend's record for Cloister, and Abbott's record for Trenton.
-, 1906. Note on Muhlenberg's Turtle. *Amer. Nat.*, XL, p. 596.
Records a specimen from Cedar Swamp Creek, Cape May Co., N. J.
- GREEN, HAROLD T., 1923. Notes on Middle States Amphibians and Reptiles. *Copeia*, No. 122, Sept. 15, p. 99.
Records specimen from Quakertown, Bucks Co., Pa.
- HARLAN, RICHARD, 1829. Genera of North American Reptilia, and a Synopsis of the species. *Journ. Acad. Nat. Sc. Phila.*, VI, pt. I, pp. 25-26.
Lists no definite localities.

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Gives no definite records.
- LECONTE, JOHN, 1830. Description of the Species of North American Tortoises. Ann. Lyc. N. Y., III, pp. 119-120.
Gives no definite records.
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Record specimens from Emaus and Macungie.
- REED, HUGH D. & WRIGHT, ALBERT H., 1909. The Vertebrates of the Cayuga Lake Basin, N. Y. Proc. Amer. Phil. Soc., XLVIII, p. 409.
Give three records for the region.
- SAY, THOMAS, 1825. On the fresh water and land Tortoises of the United States. Journ. Acad. Nat. Sc. Phila., IV, pt. II, pp. 205 and 212-213.
Lists no definite records.
- STEJNEGER, L. & BARBOUR, T., 1923. A Check-list of North American Amphibians and Reptiles. Cambridge. p. 130.
Lancaster, Pa. given as type locality.
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Lists specimens from West Bradford Twp., Chester Co., Tinicum, Delaware (?) Co., and "near Philadelphia" in Pennsylvania; and Medford and Audubon in New Jersey.
- STREET, J. F., 1914. Amphibians and Reptiles Observed at Beverly, N. J. Copeia, No. 4, March 14.
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- SURFACE, H. A., 1908. First Report on the Economic Features of Turtles of Pennsylvania. Zoöl. Bull. Pa. Dept. Agri., VI, Nos. 4 & 5, Sept. 1, pp. 156-158.
Records specimens from Essington and Media, Delaware Co., Pa.
- TOWNSEND, C. H., 1906. A Note on Muhlenberg's Turtle. Bull. N. Y. Zool. Soc., No. 22, July, p. 289.
Records specimens from Cloister, N. J.

WRIGHT, ALBERT H., 1918 a. Notes on Muhlenberg's Turtle.
Copeia, No. 52, Jan. 17, pp. 5-7.

Lists many specimens from Larch Meadows, Junius, Bergen, and Westbury, N. Y. All of these specimens were taken in or near sphagnaceous areas.

....., 1918 b. Notes on Clemmys. Proc. Biol. Soc. Wash., 31, June 29, pp. 51-54.

Lists specimens from Junius, Bergen, Ithaca, N. Y., and from Hackensack, N. J. Refers *Clemmys nuchalis* Dunn to synonymy.

....., 1919. The Turtles and The Lizard of Monroe and Wayne Counties, New York. Copeia, No. 66, Feb. 25, p. 7.

Again mentions Bergen and Westbury records.

YARROW, H. C., 1883. Check List of North American Reptilia and Batrachia, with Catalogue of Specimens in U. S. National Museum. Bull. U. S. N. M., No. 24, p. 36.

Lists three from Statesville, N. C. and two from Upper Darby, Pa.